

# Chapter

# Modeling Data in the Organization

# System Modeling

- **Process Modeling**
- **Data Modeling**
- **Object Modeling**

Process-Oriented Approach

Data-Oriented Approach


Object-Oriented Approach

# Entity Relationship (E-R) Model

- A detailed, logical representation of the data for an organization or business area
- Expressed in terms of Entities, Relationships and Attributes
- E-R Diagram: A Graphical Representation of an E-R Model

# Entity

- An object or concept that is important to the business and the organization chooses to record data

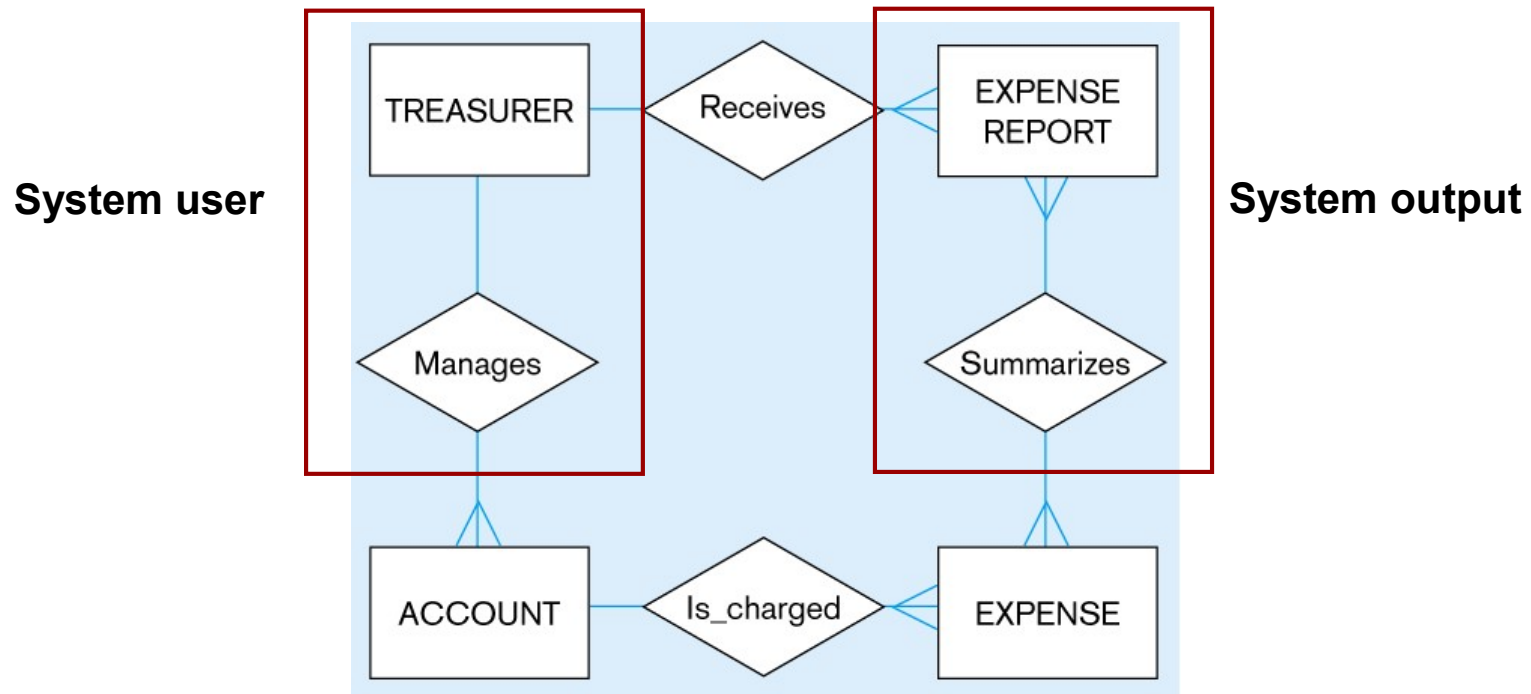
A blue rectangular box with a black border, containing the text "Entity Symbol".

Entity Symbol

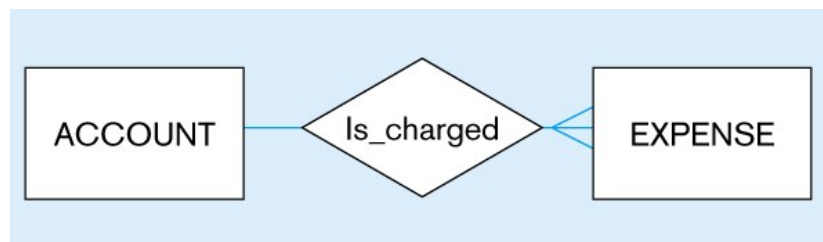
## What Should an Entity Be?

- SHOULD BE:
  - An object that will have many instances in the database
  - An object that will be composed of multiple attributes
  - An object that we are trying to model
- SHOULD NOT BE:
  - A user of the database system
  - An output of the database system (e.g. a report)

### Inappropriate entities



### Appropriate entities



## Terms

**Entity Instance:** Single occurrence of an entity type.

**Attribute:** Property or characteristic of an entity that is of interest to the organization.

**Composite Attribute:** An attribute that can be broken down into its component parts

## More Terms

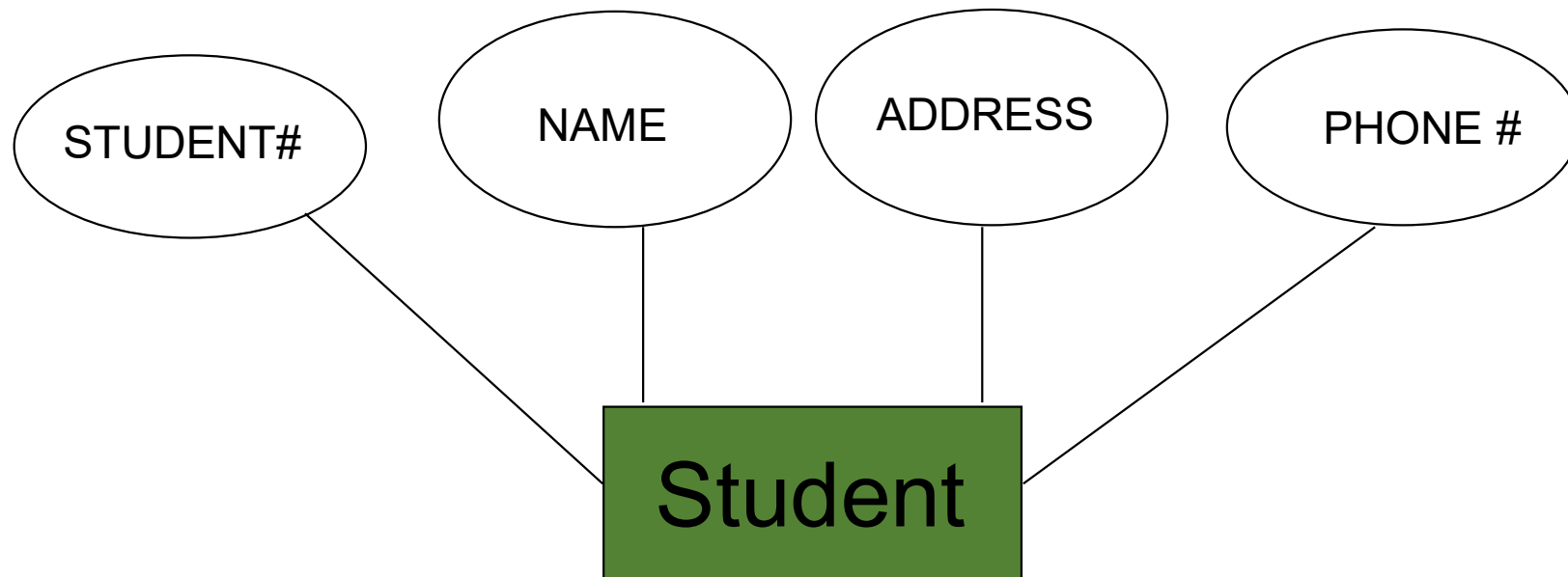
**Single Attribute:** Cannot be broken down into smaller components

**Multivalued Attribute:** May take on more than one value for a given entity instance

**Derived Attribute:** Values can be calculated from related attribute values

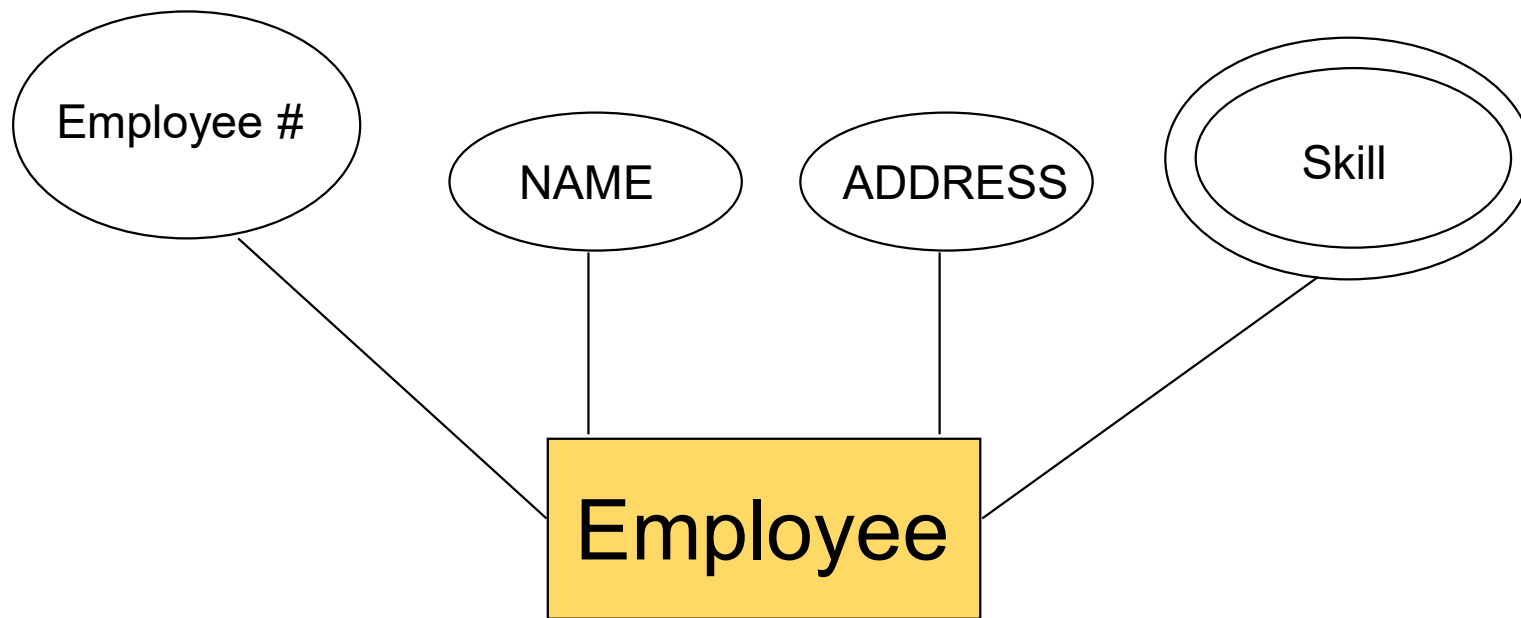


## Simple Example of Entity

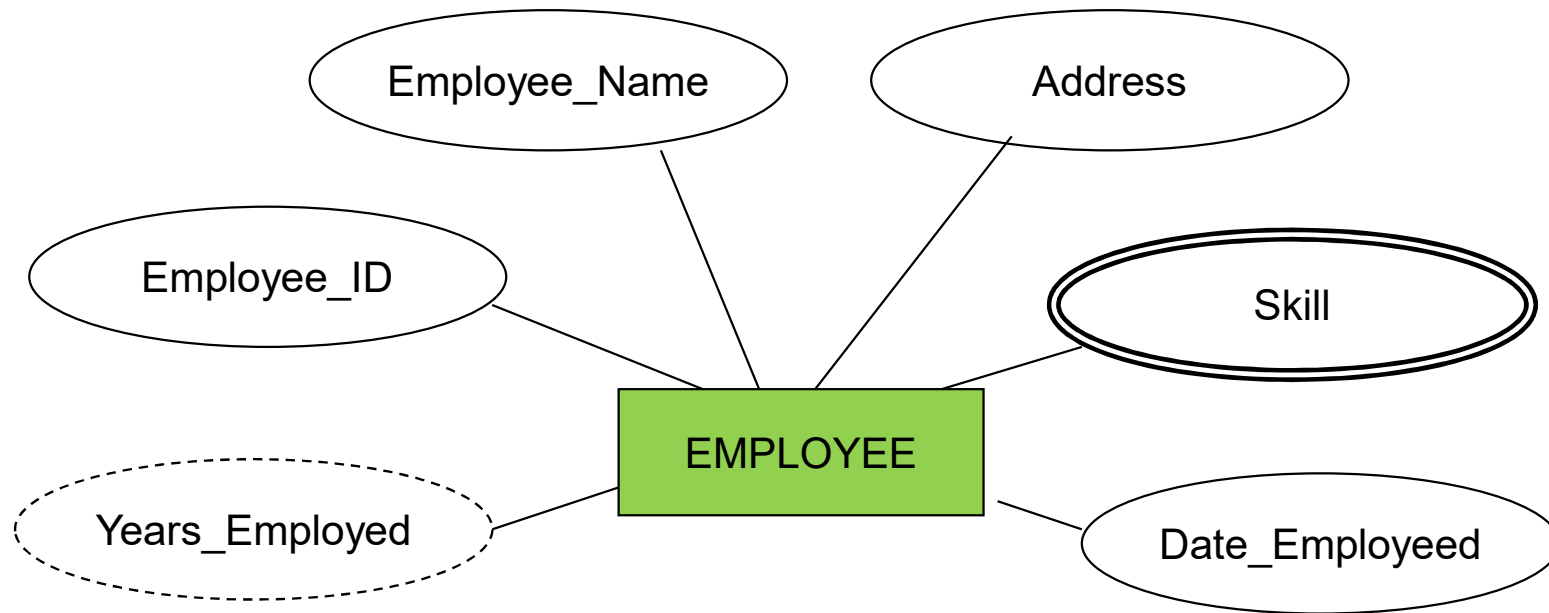


## Multivalued Attributes

An attribute that can have more than one value for each entity instance



## Example (Multi/Derived)



## Example (Entity Type)

Entity Type:      **Employee**

Attributes:      Employee #  
Name  
Address  
City  
State  
Zip  
Year Hired  
Birthdate

## Instance of Employee

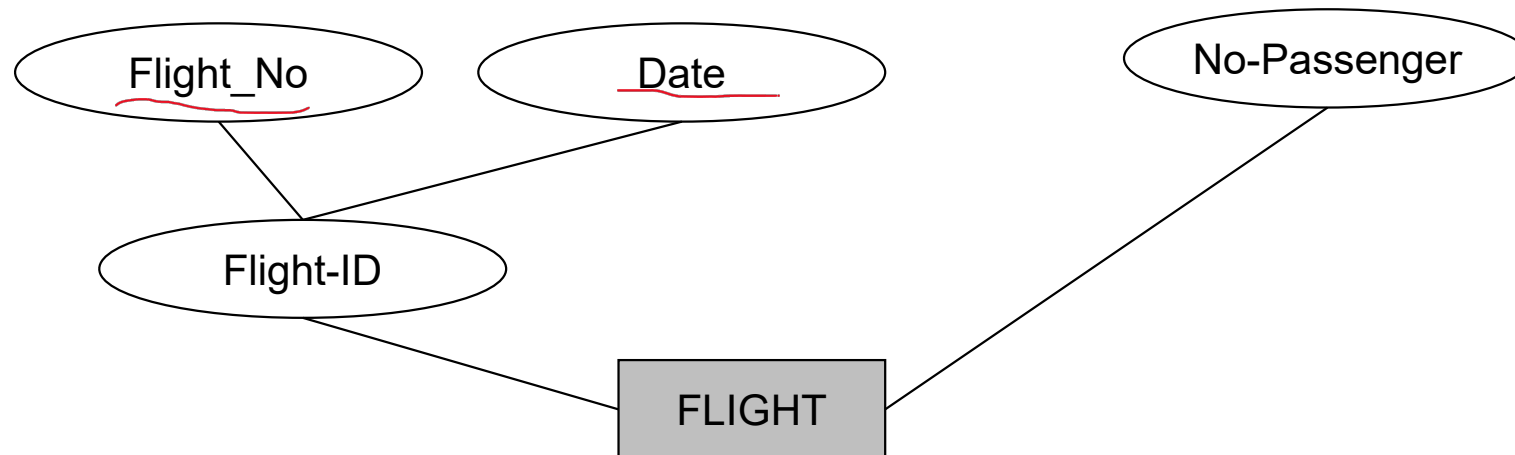
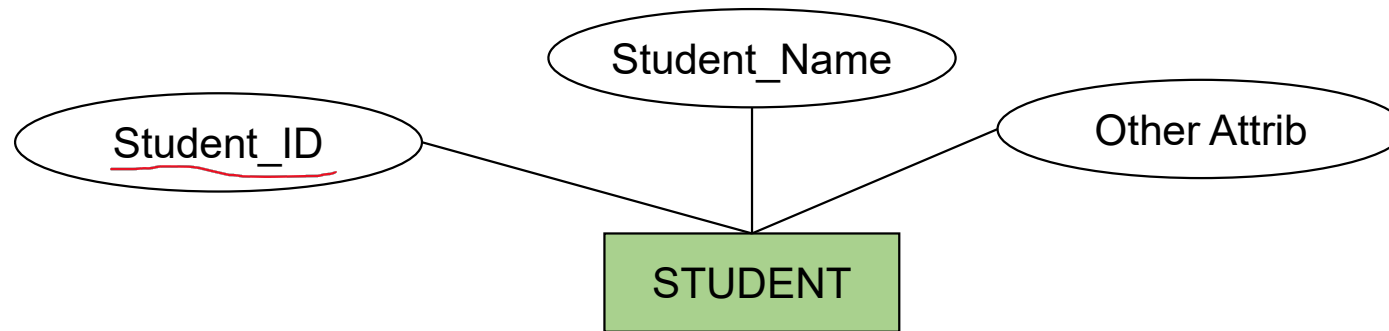
Employee #	642-17-8360
Name	Michelle Brady
Address	100 Pacific Ave
City	San Francisco
State	CA
Zip	98317
Year Hired	1989
Birthdate	6-19-64

## More Terms

**Identifier:** an attribute (or combination of attributes) that uniquely identifies each instance of an entity type.

**Composite Identifier:** An identifier that consists of a composite attribute

# Simple and Composite Identifier



## Definitions

- Primary Key - a data item that is unique to each record
- Compound Key - primary key consisting of multiple fields
- Keys are used to relate several tables together.
- Foreign Key - a field in one table that is a primary key to another table.

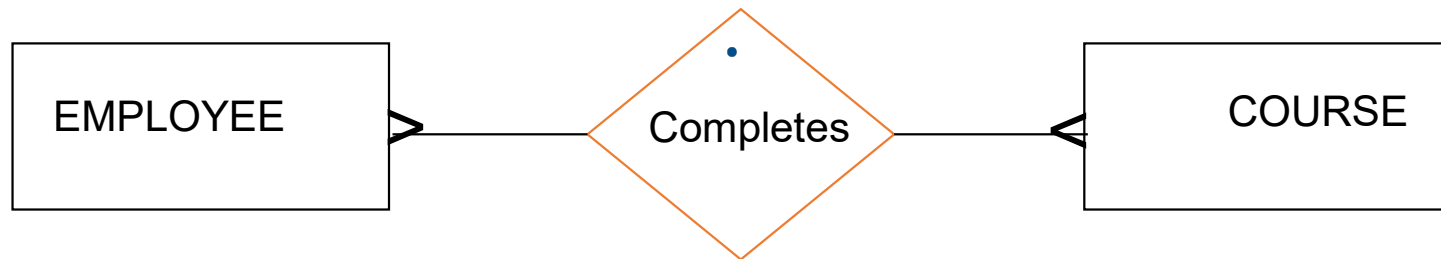


## Characteristics of Identifiers

- Use attribute(s) that will not change over time
- Must never be empty “null”
- Avoid intelligent keys: e.g. containing locations or people that might change.
- Substitute new, simple keys for long, composite keys

## Relationships

An association between instances of one or more entity types that is of interest to the organization (VERB)



## Relationship

- Associations between entities captured by business rules
  - each customer places any number of customer orders
  - each customer order is placed by exactly one customer